5 PROCESS MANAGEMENT

SSCOM continually and systematically designs, evaluates and improves its key aspects of process management, including customer focused design, product and service delivery processes, support services, and supplier management.

5.1 Design/Introduction of Products/Services

SSCOM leadership is the driver in systematically and continually designing, evaluating and improving designs and design processes to exceed customer requirements, as seen in the SSCOM Continuous Improvement System (Figure 1.4) and in step 3 of the SSCOM Business Cycle (Figure 3.2). We strategically deploy design processes to meet goals (section 3.2).

5.1a Design Development

SSCOM's umbrella product design methodology is the Life Cycle Management Process for SSCOM Products, Figure 5.1. This process represents the mandated Department of Defense (DoD) acquisition cycle as implemented by Army Regulations.

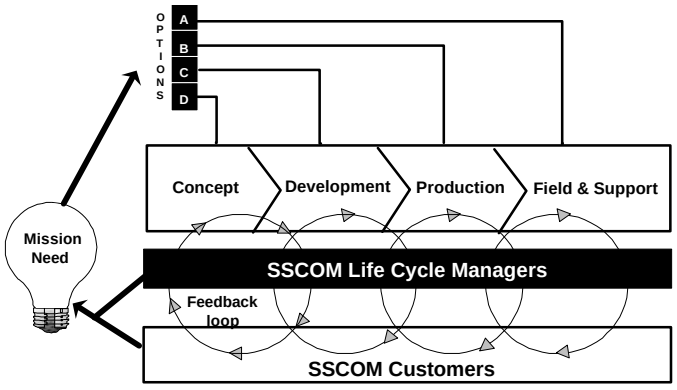

Figure 5.1. Life Cycle Management Process for SSCOM Products

The Integrated Planning Process (TIPP), Figure 5.2, is used to plan for Science and Technology programs transitioning from concept to development, in Figure 5.1. TIPP utilizes continuous feedback from stakeholders and merchants to meet customer needs (section 5.2b).

We apply the concepts of Integrated Product and Process Development (IPPD) and Integrated Product

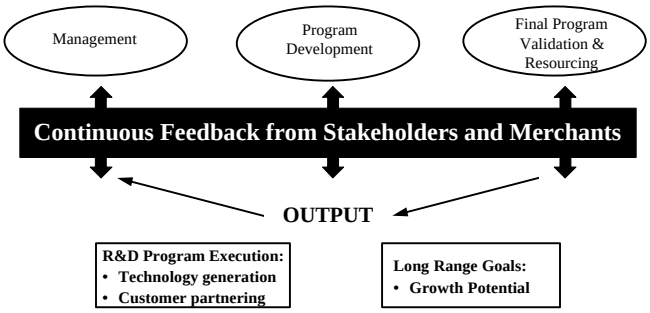

Figure 5.2. The Integrated Planning Process (TIPP)

Teams (IPTs) throughout the life cycle management of our products and services.

IPPD is a management process (Figure 5.3) that integrates all activities from product concept through production/field support, using a multifunctional team, to simultaneously optimize the product and its manufacturing and sustainment process to meet cost and performance objectives. The power of IPPD is its tailorability to any development effort regardless of complexity.

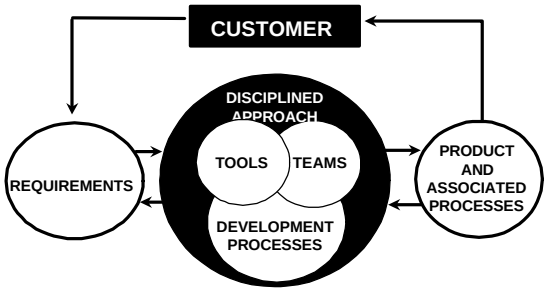

Figure 5.3. Integrated Product and Process Development (IPPD) Process

IPPD is implemented by our Integrated Product Teams (IPTs), cross-functional/multi-discipline teams that are formed to design/deliver specific products to external customers. Our leadership highly encourages and supports the utilization of IPTs in life cycle management of products/processes. IPT members may include: customers, contractors/suppliers, contracting officers, lawyers, engineers (system, mechanical, electrical, manufacturing, production, human factors, safety, environmental, facilities, quality, reliability and maintenance), testers, evaluators, software developers and logisticians. The tailorability of IPTs allows them to be used at any level in an organization, as seen in

Figure 5.4 (part of Figure 1.4, the SSCOM Continuous Improvement System).

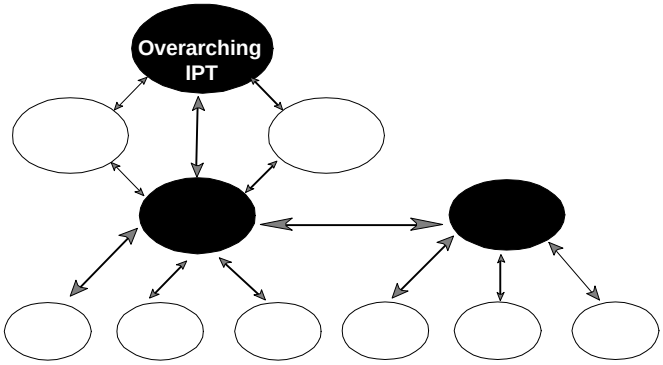

Figure 5.4. Integrated Product Teams (IPTs)

When an IPT has membership external to our command, we may implement a formal agreement, a Memorandum of Understanding or Memorandum of Agreement (MOU or MOA). The MOU/ MOA makes teaming easier between SSCOM and other agencies, by defining responsibilities and funding agreements up front.

IPTs constantly share information within their own teams and with other IPTs in the same or different life cycle phases. This exchange of information is represented by the interlocked feedback loops shown in Figure 5.1. Through these relationships lessons learned are applied across IPTs to achieve better product quality and shortened cycle time. IPTs practice an integrated acquisition approach across all phases of the acquisition life cycle.

Technology insertion is a mechanism for taking advantage of other IPT efforts. A specific technology in an earlier acquisition phase (i.e. concept) can be inserted into a later acquisition phase (i.e. development) when it is mature enough and does not compromise cost, schedule, or performance. For example, the revised Land Warrior development program inserted technologies into its program baseline from the Generation II (GEN II) Soldier program. Land Warrior IPTs plan to use additional technology insertions, as appropriate, at future points in the program.

The Clothing and Individual Equipment (CIE) Acquisition Process, part of the SSCOM Life Cycle Management Process, uses Integrated Acquisition for CIE items. Specific IPTs for acquisition, Integrated Acquisition Teams, use IPPD to reduce cycle time in fielding CIE items (section 5.2b and Figure 5.5).

Translating Customer Requirements into Product and Service Design Requirements. The process in Figure 5.1 begins with the identification of a mission need by either our customers, our life cycle managers, or both. During the development of generic state-of-the-art technologies, we work closely with the U.S. Army Training and Doctrine Command (TRADOC) to establish broad user requirements. TRADOC Battle Labs warfighting experiments provide interaction between soldiers and SSCOM to define requirements. We prepare Science and Technology Objective (STO) proposals (concept phase in Figure 5.1), based on TRADOC Battle Labs Operational Capability Requirements. A STO states a specific, measurable, major technology advancement to be achieved by a specific fiscal year. STOs are reviewed annually at Joint AMC(SSCOM)/TRADOC meetings and approved by the Army Science and Technology Working Group.

The user community (e.g., the U.S. Army Infantry School) documents a need in a formal Mission Need Statement (MNS), which may evolve into an Operational Requirements Document (ORD). We actively participate in IPTs with customers to prepare MNSs and ORDs. We systematically learn about customer requirements (section 7.1) and translate them into design requirements. We collocate personnel with key customers to gain first hand knowledge of their needs and to achieve robust integrated relationships (Figure 7.4). Through our Scientists and Engineers Field Experience with Soldiers (SEFEWS) program (sections 7.2d, 7.3), we spend time with soldiers in the field to gain hands-on product experience, customer feedback, and insight into unstated requirements which are fed into the requirements generation process.

Translating Design Requirements into Production/Delivery Processes. Once an Operational Requirements Document is approved, IPT members meet to discuss customer requirements and to develop a program acquisition strategy. The IPT determines the smartest, most cost effective, and quickest way to meet or exceed customer expectations. During this process, the IPT determines whether to purchase a domestic or foreign item (either commercial or government) "off-the-shelf" (Option A in Figure 5.1), to modify an existing product (Option B or C), or to develop a new product (Option C or D). Market survey information enables the IPT to decide where to enter the acquisi-

tion life cycle. The acquisition strategy documents how the IPT will proceed through the cycle using metrics. The IPT continually develops, tests and evaluates designs throughout the life cycle. We use measurement plans with metrics to continuously track, manage and improve design process performance (section 5.2a).

Addressing Product and Service Requirements Early in the Design Process. All life cycle requirements are addressed early in product/process design, through IPPD/IPTs. The cross-functional, multi-discipline nature of the IPTs ensures that product and service designs are managed to meet or exceed customer expectations. Product performance is regularly measured against performance requirements. Formal reviews and tests are conducted at every program milestone before entering the next life cycle phase. Since IPT members each have their own area of expertise, trade-off analyses are more thorough and accurate, and problems are identified and addressed early in the design process. Suppliers, as members of IPTs, are involved early to ensure proper integration and to help overcome technical challenges.

5.1b Design Review

SSCOM participates in formal design reviews with customers and suppliers to evaluate technical and operational performance at key program milestones. IPT members continually review designs through IPPD. For a program to progress to the next life cycle phase (Figure 5.1), exit criteria, previously agreed upon by IPT members, must be met. Our development phase ends in an Army decision process known as Type Classification (TC). TC allows the IPT to formally document that a product design meets all customer requirements and is ready for production. A Performance Specification, containing operational performance criteria, design interfaces with other systems and quality parameters, is prepared and approved. The IPT remains with the product into production and fielding phases.

5.1c Design Evaluation and Improvement

Designs are tested to evaluate performance and producibility. Test readiness reviews are conducted prior to technical testing (without soldiers) and operational testing (with soldiers). Tests are conducted by independent testers and evaluators to provide objectivity during design evaluation. IPTs review test report data for trade-off discussions among our life cycle managers, customers, and suppliers regarding cost, schedule and performance. We also use OFIG surveys to evaluate our products (section 7.1). Through the IPPD process, lessons learned by IPTs are shared with other IPTs and senior management to improve existing process designs and introduce new designs to reduce cycle time for fielding products. We use several process design mechanisms to improve quality and operational performance while reducing cycle time (section 5.2b). The SSCOM Acquisition Improvement Program Officer champions acquisition reform initiatives. SSCOM leadership uses metrics (Figure 2.2) to evaluate process performance and to identify areas to improve quality and shorten cycle time. Metrics are used in strategic planning (section 3.1c) and in step 5 of the SSCOM Business Cycle (section 3.2a). See section 6.1 for results of design process improvements.

5.2 Process Management: Product and Service Production and Delivery

5.2a Production/Delivery Process Management

Key Processes. SSCOM meets or exceeds customer design requirements by applying the Life Cycle Management Process for SSCOM products (Figure 5.1), which includes TIPP, IPPD/IPTs and CIE Integrated Acquisition (section 5.1). We also utilize the SSCOM Business Cycle (Figure 3.2) to factor quality improvements into our production and delivery processes. CIE programs, Soldier Enhancement Programs and the Land Warrior Program are managed through IPPD/IPTs.

Measurement Plans and Maintaining Process Performance. Measurement plans are embedded in our application of IPPD/IPTs. IPTs make extensive use of meetings and reviews with customers. For example, the Force XXI Land Warrior Science and Technology program and the GEN II Soldier program use teleconferences with all IPTs, monthly tracking of suspenses, cost-to-work ratios, delivery schedules, and quarterly reports to the Force XXI Land Warrior team at formal reviews. Examples of SSCOM (PM- Soldier)

Land Warrior program measurements are:

- Program Status Report (Monthly)
- Design to Cost Report (Quarterly)
- Life Cycle Cost Report (Quarterly)
- Variance Analysis Report (Quarterly)
- Software Test Report (One Time)
- Failed Item Analysis Report (As Required)

Customers participate in reviews and are constantly in the loop regarding critical decisions that impact cost, schedule and performance.

5.2b Process Evaluation and Improvement

We evaluate and improve product and service processes using the approaches described in section 5.2a. See results in sections 6.1 and 6.2.

Improvements to TIPP Process. The TIPP process (Figure 5.2) improved dramatically over the last four years. Planning Integrations Groups/Teams (PIGs/PITs) develop programs, based on available funds and best technical approach. Teams meet regularly to discuss technology thrusts and overlap among product areas to maximize the use of funds. TIPP feedback mechanisms include lessons learned sessions, workshop feedback sheets, and resource notebook updates. Improvements to TIPP include: the integration of technical and development teams in a commodity area; starting the process earlier in the fiscal year; and more customer involvement (section 7.2).

Acquisition Cycle Improvement. The process of getting designed products to customers as quickly as possible is managed by the Integrated Acquisition process. A CIE Process Action Team (PAT), created in 1993, sanctioned the process as a major step for CIE acquisition process improvement. Integrated Acquisition involves preparation of a normal development contract with a built-in option for small-scale production. The contract Technical Evaluation Plan focuses on "Best Value" contracting which identifies a quality manufacturer across development and production phases (section 5.4). A streamlined process evolved that reduced the CIE life cycle process from 66 to 33 months (Figure 5.5). An Integrated Acquisition Team meets quarterly to continually review and adjust the CIE Acquisition Process to reduce cycle time and exceed customer expectations. Many products are fielded in less than 33 months, many within one year (Figure 6.29).

An exemplary process improvement, in the application of IPT and IPPD tailoring, is the development of the Guided Parafoil Air Drop System - Light

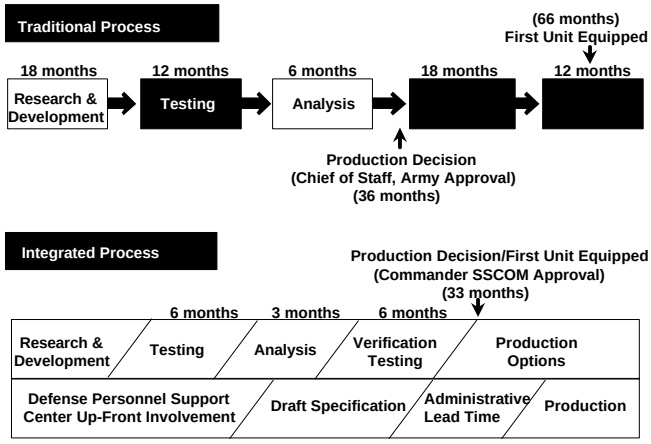

Figure 5.5. CIE Integrated Acquisition Process

(GPADS-Light) within the Warfighting Rapid Acquisition Program. The IPT streamlined the system acquisition, testing, and fielding, to deliver the user a state-of-the-art item with current technology. This process allowed an 18-month Type Classification schedule, as opposed to the normal process of 48 to 72 months, and an estimated $575K cost savings (Figure 6.27).

Modeling, Simulation and Rapid Prototyping are integral in our deployment of IPPD. We use these tools to make trade-offs with greater surety, based on simulated battlefield performance. We saved $1.8M, by using a sophisticated modeling and simulation effort to evaluate over 1000 body armor alternative configurations of threat, body coverage and weights to down-select six basic configurations for further prototyping. Rapid Prototyping allows quick evaluations of product designs to rapidly assess improvements to fielded items.

Pre-Planned Improvement. During and after product fielding, we continue to improve our products and satisfy our customers. At times during development, there are technical barriers that cannot be entirely overcome. With our customer's approval we issue a "75%" solution, relative to meeting customer needs. Pre-planned Product Improvement allows us to complete development and arrive at the 100% solution, without delaying the introduction of a

critical technology or capability. This approach was used in Force Provider, where the laundry component and the Cold Weather Kit fell short of the requirements. An improved Cold Weather Kit extended the low end operational temperature from 32°F to -15°F, allowing greater geographical deployment. The improved laundry relies on commercially available technology and parts, and requires 50% fewer personnel for operation, which reduces labor costs or redistributes manpower to other operations.

Continuous Product Improvement Program. This program was a 1992 initiative of the NRDEC Technical Director. It is an internal process, used to fill the gaps between known problems/deficiencies having no formal programs. This flexible program allows us to identify technical advances in materials or components, or develop a less expensive way to manufacture the product, and provide rapid response to customers. Successes include the integration of small arms bullet protection into a fragmentation vest for use by the Rangers (widely accepted in Somalia), as well as modifications to a survival/extraction vest made at the request of the Special Operations Forces. In each case, as a result of positive user feedback, we expect formal development programs for performance enhancements of these items.

Benchmarking. We benchmark to improve production/delivery process management (section 2.2). We systematically evaluate and improve our benchmarking efforts by establishing partnerships with recognized leaders such as Motorola. SSCOM has adapted the Motorola licensed IPPD process for production/delivery of our products.

Use of Alternative Technology. Alternative technologies are used to improve production/delivery processes, operational performance and to meet customer requirements. At the start of each project, our project officers conduct national and international market surveys to capture alternative technology from commercial, governmental and academic organizations. SSCOM has 3-D Laser Body Image Scanning equipment, which is employed in the development of new CIE items. This technology provides improved capabilities as well as replaces older and less accurate methods of obtaining body measurements necessary to design new CIE systems. A new Center for Military Biomechanical Research provides improved technologies to generate or validate data used in modeling and simulation of SSCOM items. Our International and Foreign Intelligence Office has 20 Data Exchange Agreements with eight countries as a means of sharing technology between sovereign countries and moving toward the multinational interoperability so necessary to future Army involvements.

Customer Feedback. Customer feedback is critical to production/delivery process improvement. Internal and external feedback is obtained through key listening and learning forums (Figure 7.3) and through formal surveys by our Operational Forces Interface Group (section 7.4). Suggestions for process improvement are often adopted and lead to positive results.

5.3 Process Management: Support Services

SSCOM's seven key support service processes are: Resource Management; Human Resources; Logistics; Information Management; Public Works; Acquisition; and Environmental, Safety and Health. Leadership directs all support services to use the Continuous Improvement Methodology (CIM), Figure 5.6, which utilizes Plan-Do-Check-Act Cycles, process improvement mechanisms (section 5.2), and tools in the SSCOM Business Cycle (Figure 3.2) to continuously improve operational performance. CIM is also part of Figure 1.4, the SSCOM Continuous Improvement System.

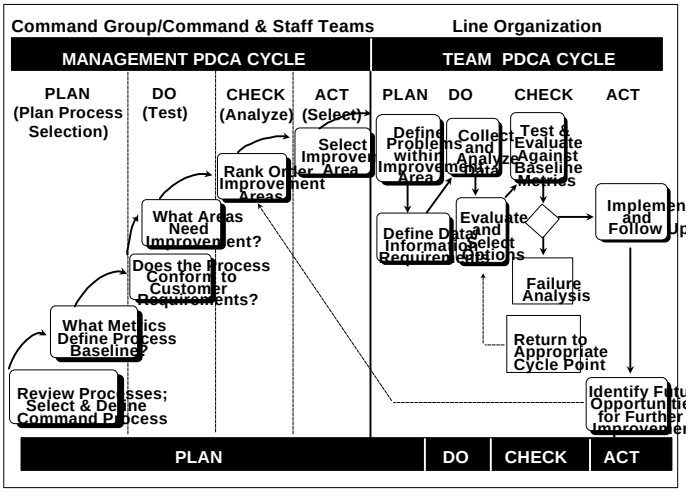

Figure 5.6. Continuous Improvement Methodology (CIM)

5.3a Designing Key Support Service Processes

Determining Requirements. Support service requirements are determined through the SSCOM Business Plan, customer needs, and government regulations. All support services collect and analyze customer feedback data to design or improve processes for performance improvements.

Translating Requirements into Efficient and Effective Processes. Support service processes are managed to meet customer quality and operational performance requirements. The support services provide the framework for the systematic evaluation and improvement of support service processes. Process Action Teams (PATs) design support service processes to exceed customer requirements. Established PATs include: Project Management System; Payment; Labor Reporting; Procurement Work Directive; Integrated Planning; Technical Evaluation Plan; and Contract Solicitation. Aside from formalized PATs, management encourages teaming of any kind to address specific issues. Teaming can be as complex as the formal Information Systems Management Plan PAT, which defined a long-range action plan for SSCOM information systems, to the informal Secretarial PAT, which defined the roles and responsibilities of secretaries in a personal computer environment. New products and services resulting from these PATs achieve time and cost reductions, and/or a significant capability enhancement (section 7.4).

Addressing Requirements Early in Design. Internal and external organizations participate during the initial design of support service processes to ensure proper integration, coordination and capability. IPTs for product delivery include support service team members to ensure we address support service requirements early. Support service members continuously facilitate work to ensure smooth processing and reduced cycle time.

5.3b Maintaining Performance of Key Support Service Processes To Meet Requirements

We use the process improvement methods described in Figure 3.2 to systematically identify, evaluate and improve key support service processes.

Key Processes and their Principal Requirements. We clearly define requirements and expectations for service support processes. PATs specifically address interfaces existing within the customer/support service chain. PATs address the entire spectrum of customers and support services. A PAT for Finance and Accounting developed a more efficient payment process for contractors. See results in section 6.2. A key process within the Information Management support service is acquisition of automated systems for information and data distribution and analysis. Performance is measured through surveys of customer satisfaction and tracking the level of automation achieved in relation to the Information Systems Plan.

Measurements Used to Maintain Process Performance. All key support functions use customer surveys and focus groups to maintain performance and measure customer satisfaction. Performance is monitored and maintained by implementation of system measurement plans. Systems owners use teams to continually assess the quality and performance of key processes. Results are analyzed and corrective actions are taken.

Customer feedback is utilized in updating or changing support service planning documents such as the Information Systems Plan and the Installation Master Plan (e.g., Laboratory Revitalization Project and Space Management Plan) (section 2.1a). Addressing specific customer concerns often involves a visit to customers to discuss their problems and mutually develop solutions.

The Command and Staff Team (CAST) meets weekly to review operations and address any process performance problems (Figure 5.6). The CAST identifies, prioritizes, and tracks the work of all process action and customer focus teams. Implementation, integration and coordination at the senior leadership level ensures that process performance issues are quickly resolved (section 1.2b).

5.3c Process Evaluation and Improvement

We continually improve support service processes to achieve exceptional quality, reduce cycle time, and increase operational performance. See results in section 6.2.

Process Analysis and Research. We use the steps in Figure 3.2 and analytical tools to identify, analyze and improve support service processes. We systematically verify improvements by tracking process performance and customer feedback. Continuous process improvements include:

• 38% reduction in personnel by consolidating program analyst support (section 6.2)

• Implementation of a revised Awards nomination procedure that expands the scope of employee recognition and reduces the nominator evaluation time by two weeks

Benchmarking. Our benchmarking processes are described in section 2.2b.

• A Project Management System PAT is chartered to look at replacements to SSCOM's planning and accomplishment reporting system. We are benchmarking the Missile Command's R&D Information Management System (RIMS).

• The Human Resources support service implemented a computer application (Manager Plus) after a visit to Wright-Patterson AFB.

Use of Alternative Technology. We adopt alternative technologies to reduce administrative processing time and costs. Examples include: processing travel and training requests on electronic forms; recording time and attendance electronically; transferring funds electronically for pay and travel reimbursements; and automating the requisition process. Additional uses of alternative technologies are the use of Fuel Cell technology (section 1.3b) to reduce cost and improve air quality and the establishment of a client-server architecture to enhance communication and workplace automation.

Customer Feedback. Feedback is received from external customers (sections 7.2, 7.3, 2.3) and from internal customers (sections 4.3 and 4.4). Their combined input allows for successful process improvement results (section 6.2). Support service process owners use internal survey results to focus improvement efforts. Improvements include: customer interviews after supplier contract completion; the Help Desk for resolution of computer problems; reduction in cycle time and administrative burden in the training approval process; implementation of credit cards to reduce purchase and delivery cycle times; and streamlining (1) the purchase request process, (2) the suggestion process, and (3) the personnel action form.

5.4 Management of Supplier Performance

5.4a Communicating Requirements to Suppliers

SSCOM clearly defines quality requirements for expected supplier performance and systematically provides performance feedback to suppliers, through the SSCOM Business Cycle (Figure 3.2.). Results are in section 6.4. We use three principal quality requirements for our suppliers:

• A thorough technical proposal that is responsive to the requirements and incorporates innovative techniques and state of the art technology

• An experienced management team that is committed to quality management

• A sound financial position with a cost accounting system that allows monitoring of costs by contract

Principal Requirements for Selecting Suppliers. Quality is the primary consideration when selecting suppliers. "Best Value" contracting has replaced lowest bidder criteria. "Best Value" contracting begins with a contract strategy meeting. Customers are invited to the strategy meetings, assuring that each procurement is tailored to their needs. Solicitation Technical Evaluation Plans are designed to allow suppliers the maximum range in proposing creative solutions, and
allow us to assess the quality management systems of suppliers. The supplier with the highest level of quality and best record of successful performance is selected. The principal requirements for key suppliers are discussed in pre-solicitation/pre-award meetings. We also provide information to our suppliers in broad terms at regular Advance Planning Briefings for Industry. These briefings convey to industry our long range contracting needs and philosophies of SSCOM.

We equate customer requirements, including performance, reliability, safety, durability and storage with system quality requirements. Requirements are routinely communicated to suppliers, and we encourage them to use the IPPD/IPT approach. We review customer acquisition and engineering needs to ascertain quality requirements for suppliers. SSCOM is on-line with the FACNET (Federal Acquisition

Computer Network), part of the total package of acquisition reform legislation enacted in 1994. This service provides a "single face" to industry whereby Requests For Proposal are sent to the vendor community electronically.

Quality requirements are communicated to suppliers through marketing studies and solicitations. Requests For Proposals incorporate our quality requirements. We conduct pre-bid, pre-award and post-award conferences and make site visits to ensure our suppliers understand and implement quality requirements.

Evaluation of Supplier Performance. We work with suppliers to establish long-term relationships. We include IPPD/IPT requirements in all key contracts such as GEN II Soldier and GPADS-Light (section 5.2). Our senior staff meets with major contractors to review supplier performance. This provides a seamless partnership with our suppliers to enhance total customer satisfaction. Additional enhancement is achieved by IPTs composed of developer, customer and supplier members.

Feedback of Supplier Performance. Contracting officers frequently provide feedback to suppliers on their performance. Our Commanding General and Deputy concern themselves with customer feedback for strengthening the customer/supplier interaction. IPTs may provide on-site representation at contractor locations for performance feedback (Figure 7.4). Representatives conduct in-process reviews and are present during the testing of development prototypes to verify that the items meet the performance requirements.

5.4b Evaluating/Improving Supplier Management

We focus on three key areas with suppliers: enhancing their ability to meet requirements; improving our procurement process; and reducing inspection and related costs.

Reengineering the Acquisition Process. SSCOM is a leader in the use of performance specifications (Figure 6.43) which contributes to our overall focus of reengineering the acquisition process. A performance specification describes how the item being procured must function in its intended application. Suppliers are accountable for the quality and performance of their products. We apply IPPD/IPTs throughout contract solicitation processes, supplier selection, test and evaluation, and acceptance/delivery of the final product. Our technical experts work closely with suppliers to resolve any difficulties.

Quality in Suppliers. We focus on making selections from quality suppliers. We emphasize quality management functions and past contractor performance, as part of a unified approach, to assure quality is the primary consideration at all times in the selection of our suppliers. We continually and systematically identify and evaluate suppliers.

Internal Processes. We continually seek and evaluate both internal and external feedback to improve our procurement processes. We assign IPTs for key acquisitions and assign dedicated buyers due to the diversity of our procurements. We provide feedback forms to suppliers and to internal customers and use the returned information to continually improve our operational performance.

PATs analyze and improve our procurement processes, by developing and writing manuals on the preparation and utilization of procurement documents. For example, a 1993 PAT published a manual entitled "How to Prepare and Execute a Technical Evaluation Plan" (1994), which is the basis for our "Best Value" contracting. Our Core Curriculum Program (Figure 4.5) includes Contracting Officer Representative classes and a class on the preparation of Technical Evaluation Plans. This training improves the clarity of our Requests For Proposals and technical evaluations, which makes it easier for contractors to prepare responsive proposals and produces better relationships with both successful and unsuccessful offers.

Minimizing Cost to Verify Supplier Performance. We use performance specifications, Integrated Acquisition and tailored IPPD processes to manage supplier performance. These tools reduce the cost of testing and auditing to verify supplier performance. IPTs ensure small production quantities meet our performance requirements and they make any necessary improvements before going to large quantity production. Small quantity production allows a potential cost saving of 50% or greater due to the reduced number of items that need to be manufactured to confirm design producibility.